# A WATERSHED MONITORING SYSTEM

*By*

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# ACKNOWLEDGEMENTS


- West Virginia High Technology Consortium Foundation
- West Virginia Stream Partners Program
- Canaan Valley Institute
- Mason-Dixon Historical Park/Dunkard Creek Watershed Association

# BACKGROUND

- Stream users feel that Dunkard Creek has suffered significant damage to its ability to provide a strong fish habitat
- Historical monitoring data was acquired and reviewed with no obvious causes identified
- Procurement of a monitoring system
- Selection of monitoring stations
- Collection of monthly data

# BACKGROUND CONTINUED

- Development of some basic analysis/display options
- Need for more easily used and understandable display procedures
- Need for more frequent sampling on a daily basis

# BASE SYSTEM

- Hydrolab Surveyor 4 and Sonde 4
  - Good monitoring system
  - Requires a rather sophisticated user
  - Many steps to get to computer based display
  - Rather expensive
- Gateway Computer System
  - 500 MHz Pentium III
  - Windows 98
  - MS Office

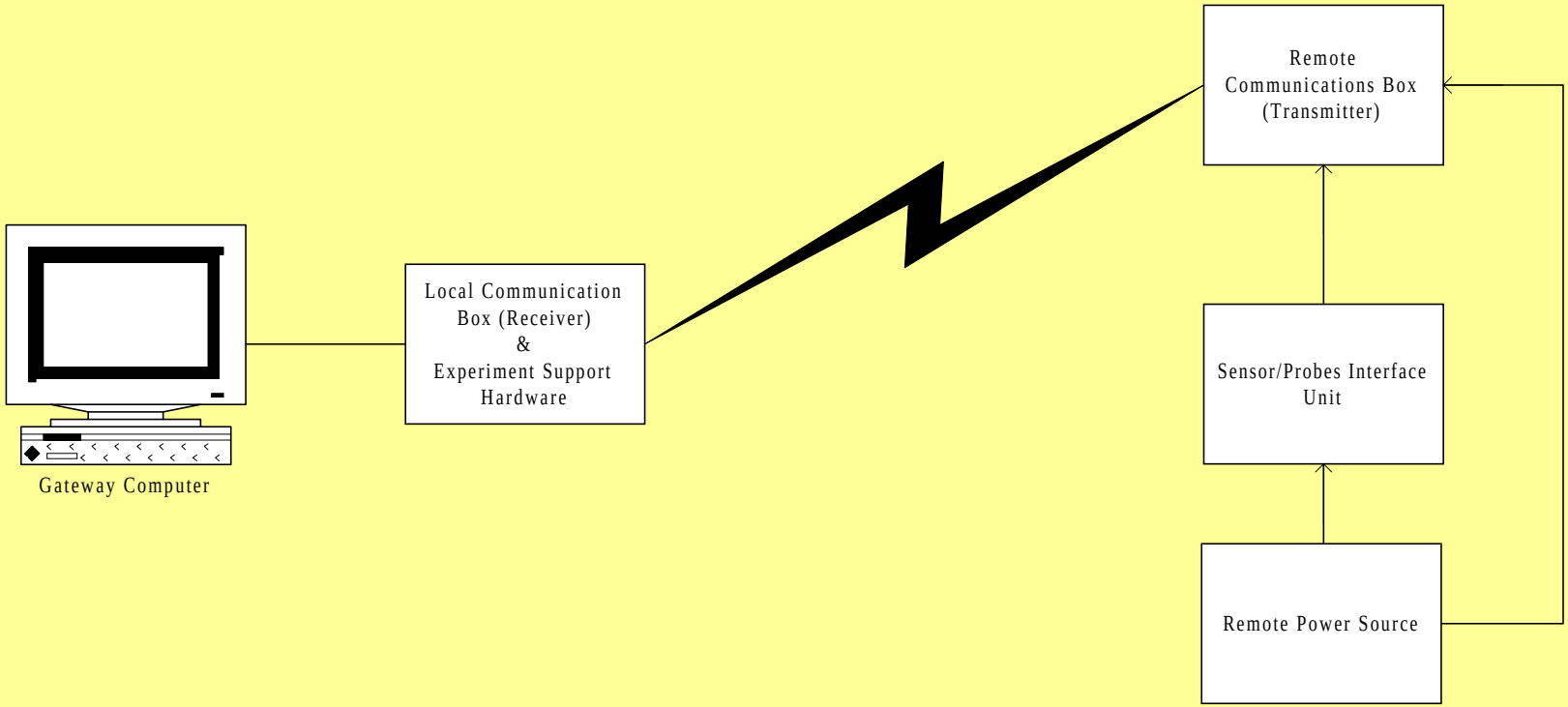
# BASE SYSTEM

- Database & File Software
  - ACCESS
  - Excel
- Display Software
  - Excel
  - PSI Plot
  - Dunkard Creek Data Display

# CONTINUOUS MONITORING SYSTEM
## Prototype Design Criteria

- Initially four variables (T, pH, Level, & Flowrate)
- Distance up to one mile line of sight
- Flexible sampling rate
- System accuracy better than +/- 2%
- Affordable by small watershed associations

# CONTINUOUS MONITORING SYSTEM



# POWER SYSTEM

- Solar Panel – Photon Technologies Inc. of Severna Park, MD

  Specifications

  ASI-3-Oo15-120/112-M :

  Voc ----- 24.5 Volts Vop ---- 18.0 Volts

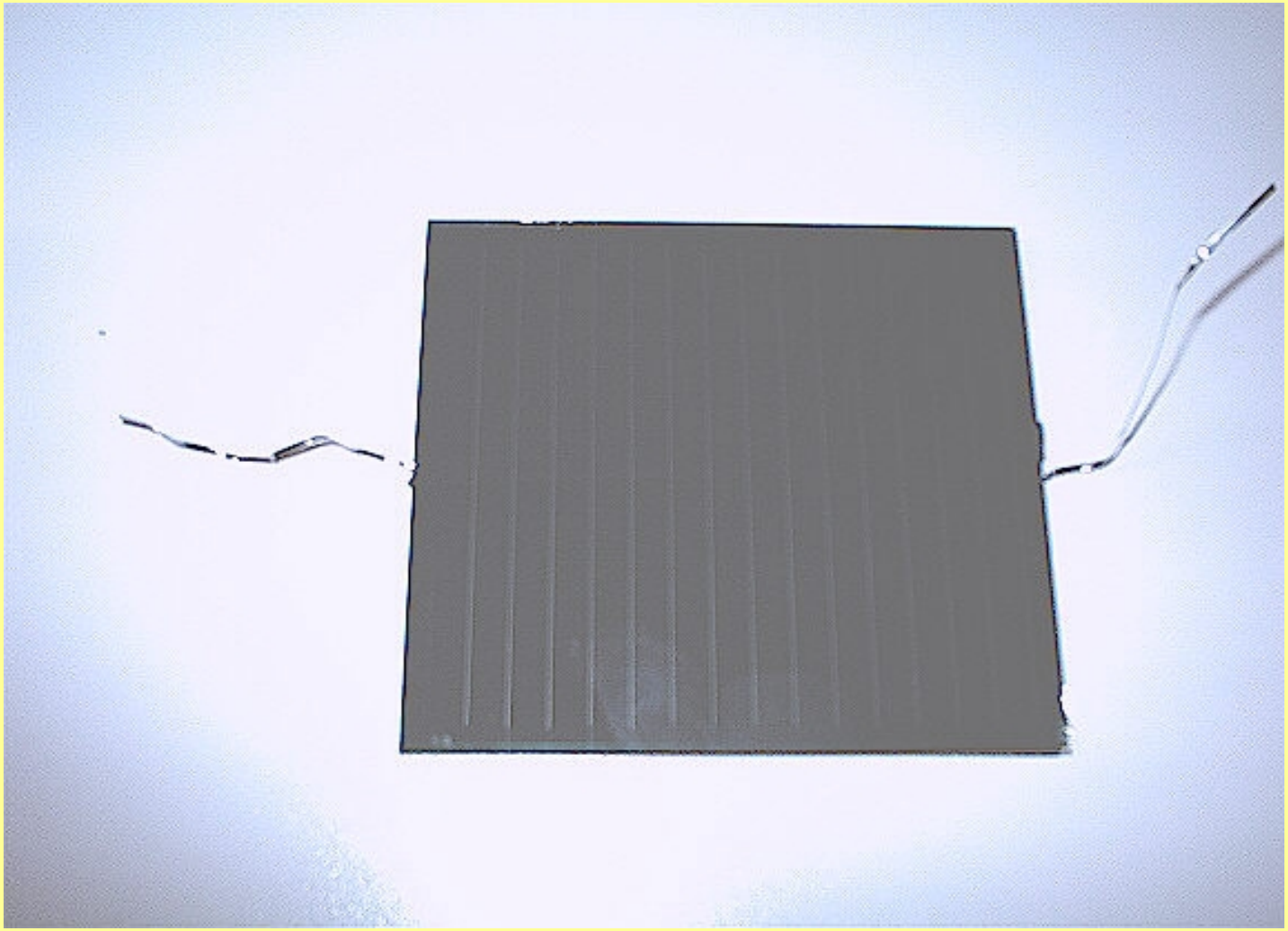
  Isc ----- 48.5 mA Iop ----- 39.0 mA

  Power -- 0.7 Watts

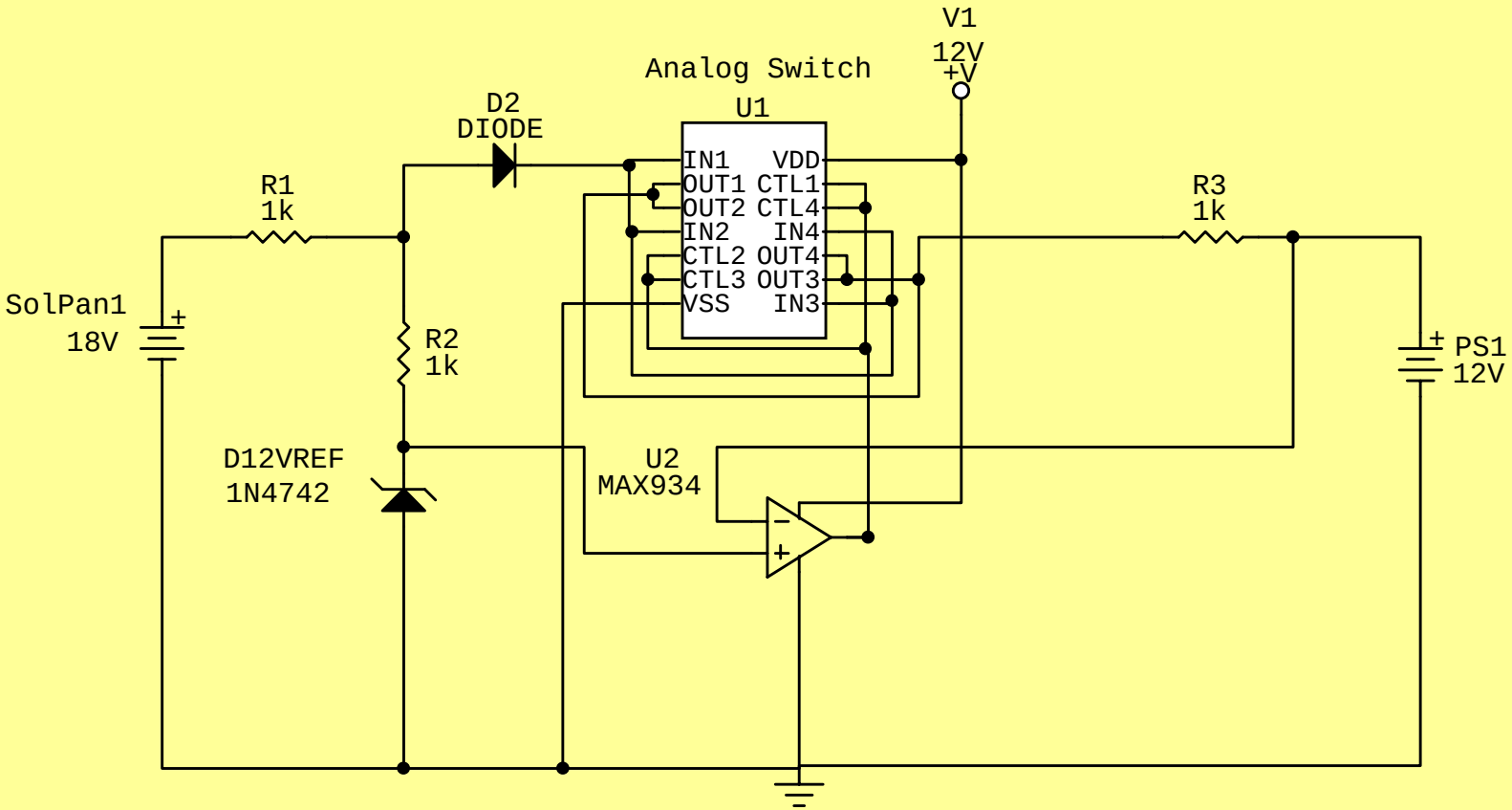
  Size ---------- 120mm x 112mm x 3.2mm

- Charging Control Circuit
- 12 Volt Storage Battery

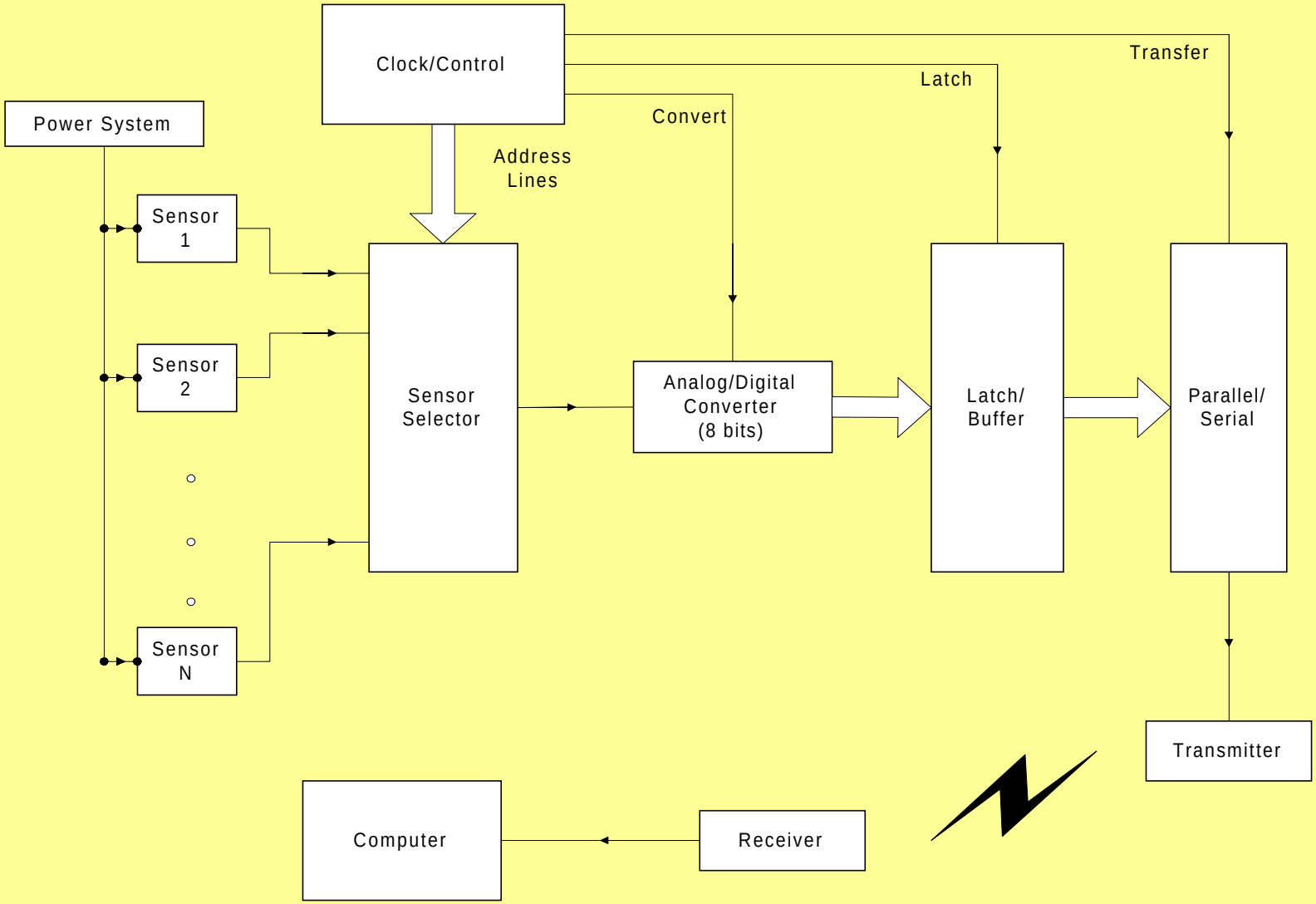
# SOLAR PANEL



# CHARGING CONTROL CIRCUIT



# SYSTEM DIAGRAM

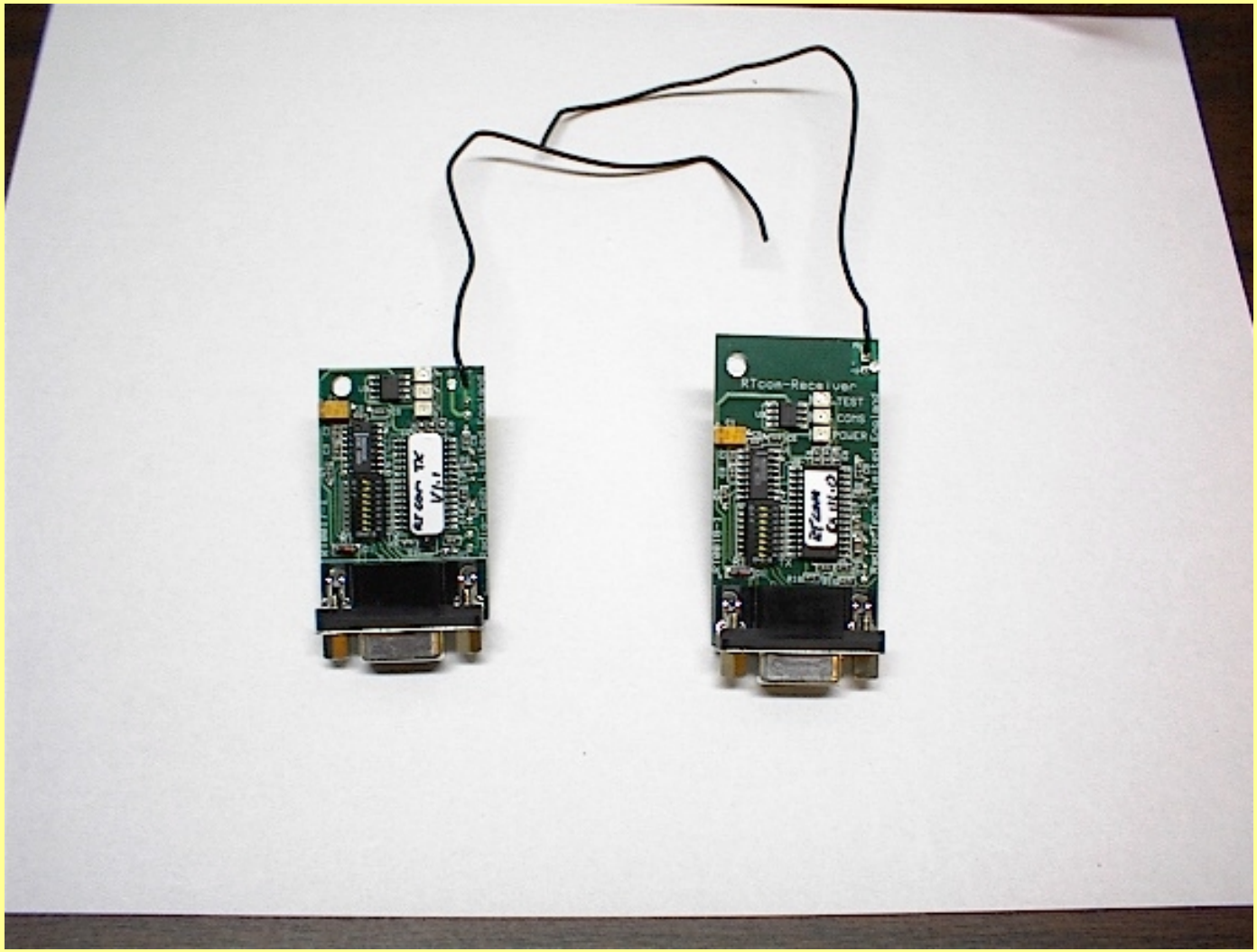


# TELEMETRY SYSTEM

- ABACOM TECHNOLOGIES
  - RTcomTx-RS232
  - RTcomRx-RS232

- Specifications
  - 2400-9600 simplex -- Auto transmit on receipt of serial data
  - Windows/DOS terminal mode operation
  - 7.5-15 VDC operation
  - Up to one mile line of sight with external antennas

# RTcomTx & RTcomRx



# TRANSMIT & RECEIVE ANTENNAS

# SENSORS

Level Measurement

Electronic Design & Packaging Company of Livonia Michigan

Specifications

Range ---------- Up to 40 feet

Accuracy ---------- +/- 0.1%

Beam Angle ------- 15 degrees

Rep Rate ---------- 10 cycles per second

Excitation ---------- 8 – 16 volts dc

Output ---------- 0 – 10 volts dc

# ULTRASONIC DISTANCE SENSOR

# SENSORS CONTINUED

- Temperature:

  Analog Devices AD592 or similar

  - Range -- -25 deg C to 105 deg C with +/- 0.5 deg C
  - Single supply 4-30 volts dc
  - 0.1 microA per deg K

- Flowrate

  Modification of previously designed digital flowmeter based on a turbine type sensor

# SENSORS CONTINUED

- pH

  Modify/Adapt gift used instrument(s) from HACH of Loveland, CO. (Greg Most)

# SUMMARY

- Working with DCWA to develop an affordable water quality monitoring system
- Currently developing a subsystem capable of continuous monitoring
- System will support other studies related to fish habitat development
- Prototype system should be demonstrated by January and field tests scheduled for summer 2001